

A M E R I C A N S T A N D A R D

# Graphical Symbols for Process Flow Diagrams

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ASA Y32.11-1961

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in the PETROLEUM AND  
CHEMICAL INDUSTRIES

## *Sponsors*

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## Foreword

THE development of these symbols under the American Standards Association procedure has been sponsored by The American Society of Mechanical Engineers and the American Institute of Electrical Engineers.

The cooperation of the American Petroleum Institute, American Institute of Chemical Engineers, Instrument Society of America, and the National Electrical Manufacturers Association is hereby acknowledged together with the response received from over 60 individual companies who submitted their drawing symbols for review and consideration by the Task Group.

Following approval by the Sectional Committee and the sponsors, this Standard was approved by the American Standards Association and received its designation on September 11, 1961.

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## AMERICAN STANDARD

## Graphical Symbols for Process Flow Diagrams

### 1. SCOPE

This preliminary set of standard symbols has been developed for use on the basic process flow diagrams in order to represent the major items of equipment used by the petroleum and chemical industries.

A process flow diagram is the first drawing made to show the basic items of major equipment and their relation to one another in the process scheme. The more important flow lines are indicated as connecting these pieces of equipment and help to describe how the process operates.

### 2. BASIC PRINCIPLES

Simplicity of outline form were considered as paramount in the development of these symbols. The main idea is to preserve the general physical appearance of the equipment, with the minimum strokes to a draftsman.

No scale is applied to a process flow diagram, but the relative size of the symbols should be selected in keeping with the overall size of the

completed drawing. The symbols should be arranged on the drawing in logical sequence of flow, from the charge material to the main product, with a minimum of cross-over lines.



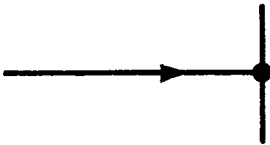
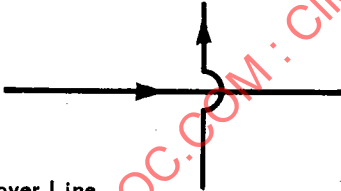
It is suggested that the equipment outlines be drawn by heavy lines, and that the connecting piping be shown as lighter lines. For the purpose of most process flow diagrams it is not considered necessary to indicate any instrumentation or electrical symbols.

### 3. GENERAL





The following 79 symbols are by no means all that were suggested or that may be required; however, by adopting these as a standard the majority of present processes may be adequately represented.

In the preparation of final drawings for the detailed design, erection or operation of a unit, the process flow diagram must be supplemented by the more detailed engineering flow sheets and the final piping layout drawings.

## AMERICAN STANDARD






Code No.	SUBJECT: LINES
1	 <p>Feed Stock (Identify by Name)</p>
2	 <p>Products (Identify by Name)</p>
3	 <p>Connecting Lines</p>
4	 <p>Crossover Line (Break all vertical lines and show loop)</p>

REMARKS:

Code No.	SUBJECT: VALVES
5	 <p>Gate</p>
6	 <p>Globe</p>
7	 <p>Plug (Cock)</p>
8	 <p>Check</p>


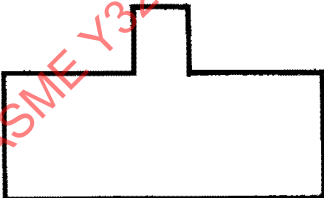
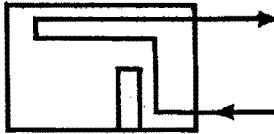
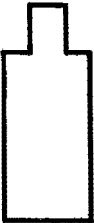
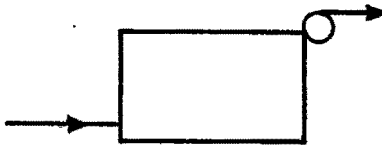
REMARKS: Show valves only where necessary to clarify Process Flow.  
See: ASA Z32.2.3-1949  
If valve is closed during normal operation write "CLOSED" directly above the valve.

## GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

Code No.	SUBJECT: PROCESS QUANTITIES
9	 Liquid Flow
10	 Weight Flow
11	 Gas Flow
12	 Pressure
13	 Temperature

## REMARKS:

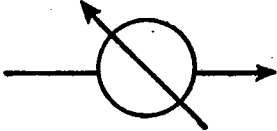
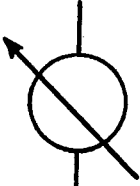
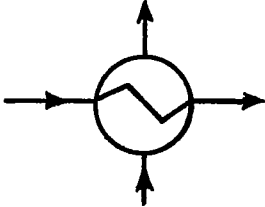
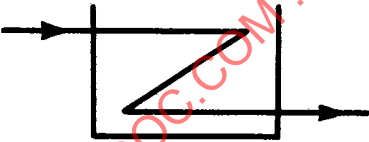

Indicate in drawing legend the values assigned to all units.  
Place numerical quantities specified within symbol.

Code No.	SUBJECT: FURNACES & BOILERS
14	 "A" Frame
15	 Box Type
16	 Radiant Type (Single Coil)
17	 Vertical
18	 Boiler Fired or Waste Heat

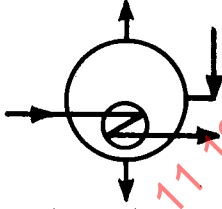
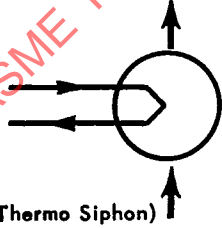
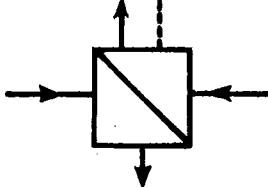
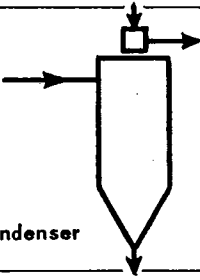
## REMARKS:

Indicate approximate position of inlet and outlet.  
If dual coil indicate path of both streams.  
Do not indicate type of fuel or firing position.

## AMERICAN STANDARD

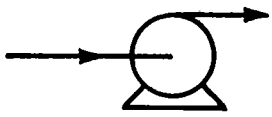
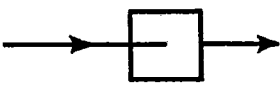
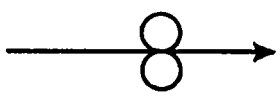
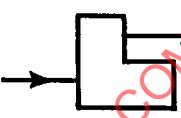
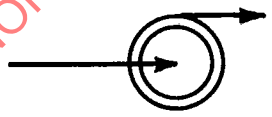
Code No.	SUBJECT: HEAT TRANSFER
19	 <p>Water Cooled Exchanger</p>
20	 <p>Water Cooled Condenser</p>
21	 <p>Shell &amp; Tube Exchanger</p>
22	 <p>Box Cooler (Single Coil)</p>
23	 <p>Cooling Tower</p>

REMARKS:  
Ref, ASA Z32.2.6-1950

Code No.	SUBJECT: HEAT TRANSFER (Cont'd)
24	 <p>Reboiler (Kettle Type)</p>
25	 <p>Reboiler (Thermo Siphon)</p>
26	 <p>Superheater or Reheater</p>
27	 <p>Barometric Condenser</p>

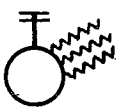




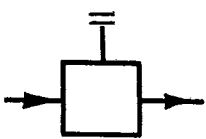
REMARKS:  
Side view of equipment may be shown  
for exchangers or reboilers

## GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

Code No.	SUBJECT: PUMPS & COMPRESSORS
28	 <p>Centrifugal</p>
29	 <p>Reciprocating</p>
30	 <p>Rotary</p>
31	 <p>Proportioning</p>
32	 <p>Blower or Fan (Centrifugal)</p>

## REMARKS:

Suggested Changes from  
ASA Z32.2, 6-1950


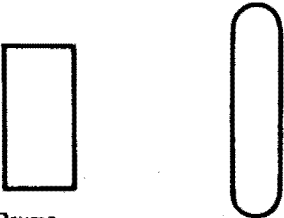

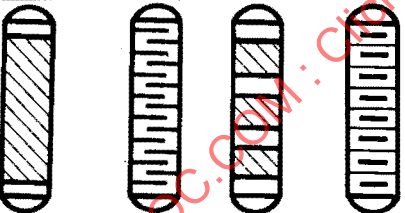
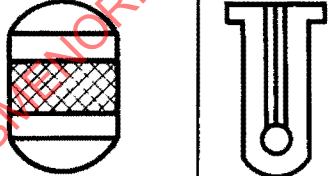
Code No.	SUBJECT: DRIVERS
33	 <p>Motor</p>
34	 <p>Engine</p>  <p>Single Drive</p>  <p>Dual Drive</p>
35	 <p>Turbine</p>
36	 <p>Steam Piston</p>

## REMARKS:



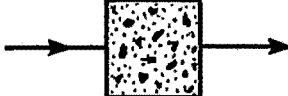
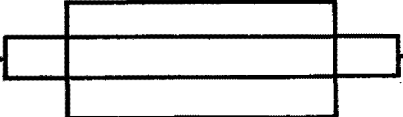
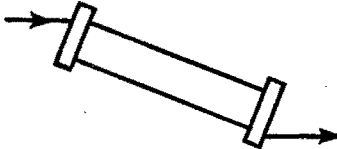
Drivers may be shown, if desired,  
attached to prime mover.  
See: ASA Y32.2 for specific  
types of motors.



## AMERICAN STANDARD

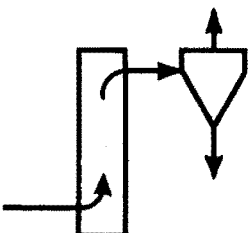
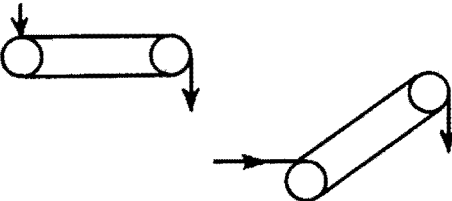
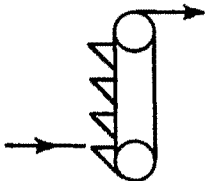

Code No.	SUBJECT: PROCESS PRESSURE VESSELS
37	 <p>Horizontal Drums</p>
38	 <p>Vertical Drums</p>
39	 <p>Jacketed Vessel (Partial)</p>
40	 <p>Packed Columns (Towers)    Plate    Sectioned    Disk &amp; Donut</p>
41	 <p>Reactor (Catalytic)    Reactor (Nuclear)</p>

REMARKS:

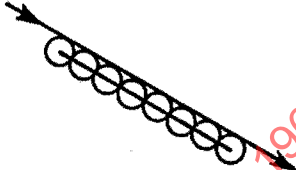


Code No.	SUBJECT: DRYERS
42	 <p>Batch Trays</p>
43	 <p>Spray</p>
44	 <p>Desiccant</p>
45	 <p>Continuous Tunnel</p>
46	 <p>Rotary Drum Dryer or Kiln</p>

REMARKS:

## GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS



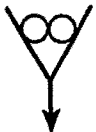
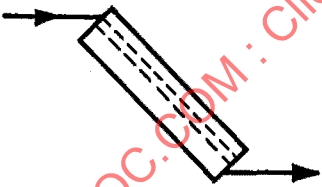
Code No.	SUBJECT: MATERIAL HANDLING EQUIPMENT
47	 <p>Air Lift</p>
48	 <p>Belt or Shaker</p>
49	 <p>Bucket or Flight Conveyor</p>
50	 <p>Screw Conveyor</p>

REMARKS:

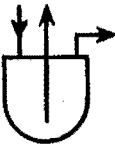

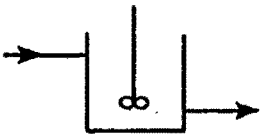

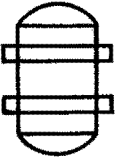
Code No.	SUBJECT: MATERIAL HANDLING EQUIPMENT (Cont'd)
51	 <p>Roller Conveyor</p>
52	 <p>Feeder &amp; Hopper</p>
53	 <p>Rotary Feeder</p>

REMARKS:

## AMERICAN STANDARD




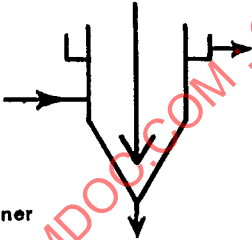
Code No.	SUBJECT: SIZE REDUCING EQUIPMENT
54	 <p>Ball Mill</p>
55	 <p>Grinder</p>
56	 <p>Roller Crusher</p>
57	 <p>Screener</p>

REMARKS:

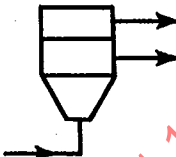
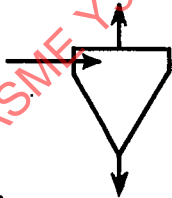
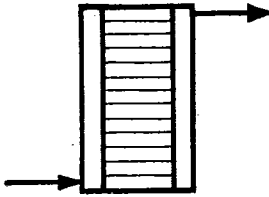
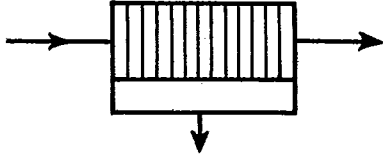
Code No.	SUBJECT: PROCESSING EQUIPMENT
58	 <p>Blowing Egg</p>
59	 <p>Extractor</p>
60	 <p>Mixer</p>
61	 <p>Settler</p>
62	 <p>Autoclave</p>

REMARKS:

## GRAPHICAL SYMBOLS FOR PROCESS FLOW DIAGRAMS

Code No.	SUBJECT: PROCESSING EQUIPMENT (Cont'd)
63	 <p>Kettle-Jacketed</p>
64	 <p>Rotary Film Dryer or Flaker</p>
65	 <p>Jet Mixer Injector, Ejector, Eductor</p>
66	 <p>Thickener</p>

REMARKS:

Code No.	SUBJECT: SEPARATORS
67	 <p>Centrifuge</p>
68	 <p>Cyclone</p>
69	 <p>Electrical Precipitator</p>
70	 <p>Filter Press</p>

REMARKS: